samarium.

Samarium has the effect of controlling the volume resistivity of an aluminum nitride sintered body as described above. It is therefore useful for controlling the volume resistivity of a member for producing semiconductors depending on the specifications required for the members. Samarium atoms contained in the sintered body might produce samarium halide when the body is exposed to a halogen series corrosive gas. The samarium halide, however, has a high melting point and a very low vapor pressure at a high temperature. It is thereby possible to reduce or prevent the contamination of semiconductors when a member for producing semiconductors is exposed to a corrosive gas (especially a halogen series corrosive gas), by forming at least a part of the member by the inventive sintered body.

The member for producing semiconductors according to the invention may preferably be an anti-corrosion member, such as a susceptor for a system for producing semiconductors. The inventive member is also suitable for an article having the above anti-corrosion member and a metal member embedded within the anti-corrosion member. Such anti-corrosion member includes a susceptor, a ring and a dome set in a system for producing semiconductors. A resistance heating element, an electrode for an electrostatic chuck and an electrode for generating high-frequency wave may be embedded within the susceptor.

The sintered body according to the invention has a low volume resistivity as described above, and therefore suitable as a substrate of an electrostatic chuck. An electrostatic chuck electrode is embedded within the substrate of the chuck. It is possible to further embed a resistance heating element, an electrode for generating plasma or the like within the substrate.

Especially in an electrostatic chuck utilizing Johnson-Rahbek effect,

it is desirable to control the volume resistivity of a substrate of the electrostatic chuck not higher than $1 \times 10^{13}\ \Omega \cdot cm$ and not lower than $1 \times 10^{8}\ \Omega \cdot cm$, for improving its adsorption force and speed of response. An aluminum nitride sintered body has high anti-corrosion property against a halogen gas and thus suitable as a member for producing semiconductors. The applicant has produced aluminum nitride sintered bodies having volume resistivities near $10^{10}\ \Omega \cdot cm$ at room temperature. The applicant has filed an aluminum nitride sintered body with a small amount of Y_2O_3 added (Japanese patent laid open publication (Kokai) with a laid-open number 315867/1997) and another sintered body with a small amount of CeO_2 (Japanese patent laid open publication (Kokai) with a laid-open number 232598/2000). Each of the sintered bodies has a relatively large temperature dependency of volume resistivity, and therefore may be used as a substrate of an electrostatic chuck only in a relatively small temperature range of about 100 ℃.

The sintered body according to the invention has a small temperature dependency of volume resistivity as described above. It is thereby possible to control the volume resistivity not higher than $1 \times 10^{13}\ \Omega \cdot cm$ and not lower than $1 \times 10^{8}\ \Omega \cdot cm$ in a wider temperature range, for example, from room temperature to 300 ℃. Such electrostatic chuck having a substrate made of the inventive sintered body may be used in a wider temperature range while preserving its anti-corrosion property, without the necessity of substitution with another kind of an electrostatic chuck.

EXAMPLES

(Experiment "A")

Aluminum nitride bodies were produced and their properties were evaluated as described below.

(1) Production of mixed powder of aluminum nitride and samarium oxide

4 types of AlN raw powdery materials were used, including 2 kinds "A" and "B" of commercial materials produced by reduction nitriding and 2 kinds of materials "C" and "D" produced by gaseous phase synthesis. "A" contains 0.97 weight percent of oxygen, "B" contains 0.87 weight percent of oxygen, "C" contains 0.44 weight percent of oxygen and "D" contains 1.20 weight percent of oxygen. A commercial powder of samarium oxide with a purity of not lower than 99.9 percent and a mean particle diameter of 1.1 μm was used.

Each powder was weighed as shown in tables 1 and 4. Each weighed powder was then subjected to wet blending using isopropyl alcohol as a solvent, a nylon pot and nylon media for 4 hours to obtain slurry. After the blending, the slurry was collected and dried at 110 ℃. The thus dried powder was then subjected to heat treatment in an atmosphere at 450 ℃ for 5 hours to remove carbon content contaminated during the wet blending to produce raw mixed powder. In the columns of "ratio (mol %)" of the mixed powder, the ratios of AlN powder and Sm2O3 powder were calculated ignoring the content of impurities.

(2) Shaping and sintering steps

Each mixed powder was then shaped by means of uniaxial pressing at a pressure of 200 kgf / cm^2 to obtain a disk-shaped body with a diameter of 100 mm and a thickness of 20 mm, which was then contained within a mold made of graphite for sintering.

Each shaped body was sintered by hot pressing at a pressure of 200 kgf / cm^2 and a temperature of 1700 to 1900 ℃ for 4 hours and then cooled. During the sintering, the shaped body was set in vacuum from room temperature to 1000 ℃ and then nitrogen gas was introduced at a pressure of